



State of Colorado Voting Systems Program Procedures Document for Certification

1 Summary

1.1 Purpose

The purpose of this document is to provide an overview of the certification process as administered by the Colorado Secretary of State's office.

1.2 Audience

This document has been written as a guide to prepare members of the Testing Board and temporary employees with primarily the functional testing (Phase III) of the certification process.

1.3 Summary

This document is to serve as a guideline. Formal procedures and guidance to the testing board shall be dictated by State Statute, Secretary of State Rules, and direction provided from the Voting Systems Technician.

It is anticipated that this document will evolve and develop over the course of interpretation and practical application of the rules governing the certification process.

Version information shall be updated and included in the footer area of this document at all times. Any references made to this document shall include such notation.

2 Certification Overview

2.1 Overview

The State certification of voting systems is the responsibility of the Secretary of State. This process is dictated as our responsibility under Colorado Revised Statute 1-5-616, and further detailed in Secretary of State Rule 45. The following diagram represents the hierarchy setup in the voting systems department for certification of voting systems:

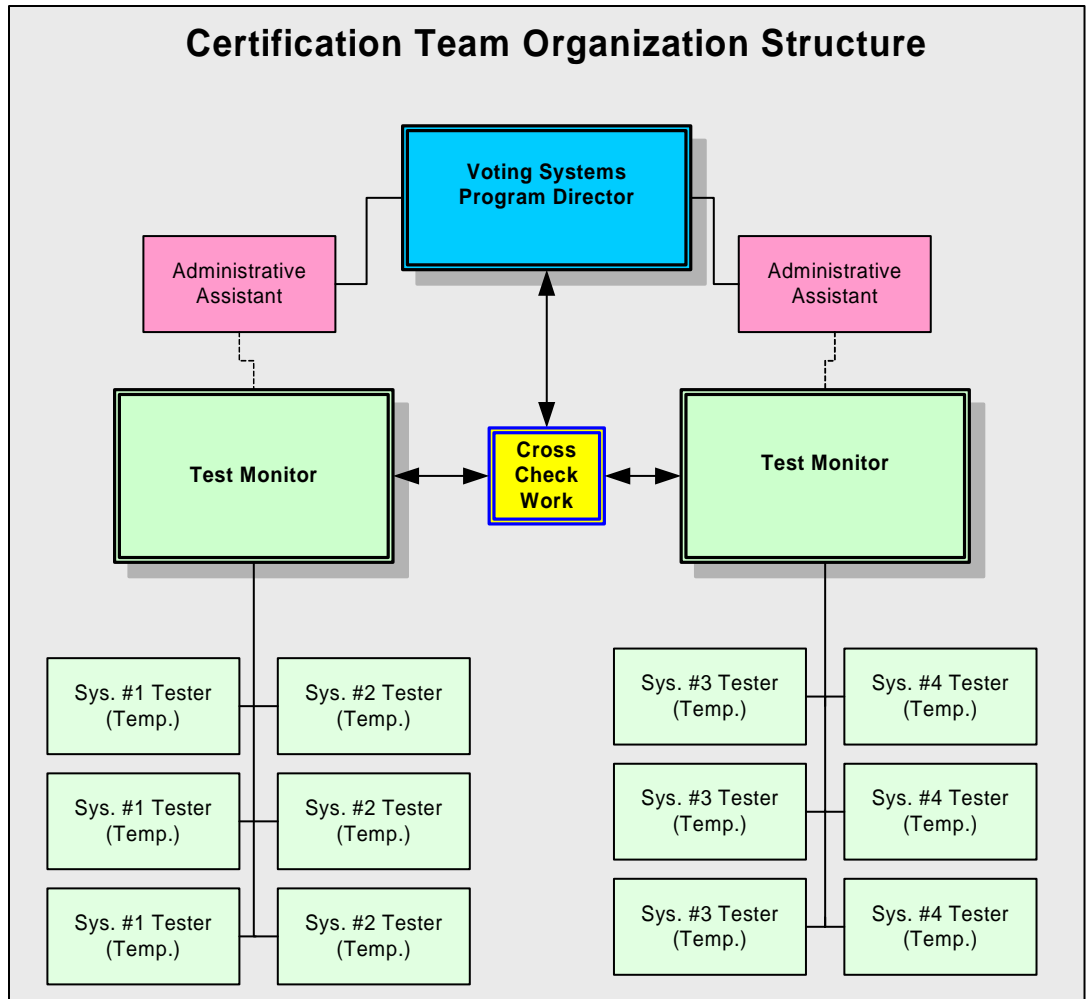


Fig. 2.1 – Organizational Chart for Voting Systems Certification Process

All voting systems used in Colorado must first pass a Federal Certification process conducted by the Elections Assistance Commission. The federal process for certifying voting systems takes between 4 and 6 months to complete.

Colorado's certification process involves a detailed documentation review followed by extensive functional testing. When complete, the functional testing process will pass over 50,000 ballots through a voting system, and the voting systems department will generate more than 2,000 pages of documentation describing the events that took place.

Colorado's certification process takes 90 days to complete.

Voting System vendors may apply for certification with a system at any time. The Secretary of State's office must make a

determination on the certification within 90 days of receipt of the application. This 90-day period is separated into four distinct phases, as follows:

2.2 Phase I - Application

Phase I is a six (6) day period where the voting systems department receives the application from the vendor and makes a determination if the application is complete.

Each vendor submits a formal application accompanied by specific documentation as required by Secretary of State Election rules.

The voting systems department verifies that it has received all documents that the vendor has indicated it would submit. A detailed analysis of the documentation occurs later in the process.

Upon receipt of the documentation, the voting systems department assigns a certification number to the application. The voting systems department then creates electronic folders and thirty (30) binders to record information related to the certification process.

After reviewing the documentation for completeness, the Secretary of State's office contacts the vendor to notify them of any documents that are missing or to inform the vendor that it is approved to move on to Phase II.

Phase I notes, requirements and documentation are included in Binder 1 for the vendor.

2.3 Phase II – Document Review

Phase II is a sixteen (16) day period where the voting systems department reviews the documentation submitted by the vendor for compliance with state and federal regulations. The work is cross-checked by three test monitors for verification that all documentation is submitted and the requirements were verified accurately.

Most of the correspondence between the Secretary of State's office and the vendor occurs during this phase with the Secretary of State requesting clarification on documents received and/or requesting documents that are missing.

Phase II documentation is included in Binders 2-6 for each system.

Refer to Section 4 of this document for more information on the document review phase.

2.4 Phase III – Functional Testing

Phase III is a thirty six (36) day period where the voting systems department conducts more than 400 functional tests on each voting system. Typically this process evaluates the system in an end-to-end fashion identifying the election management components (software) and how they interact and work with each of the voting devices (hardware).

The only requirements verified here are state level requirements. These are specifically called out in State Statutes and Rules. Each of the requirements is identified with the rule and/or appropriate statute in the testing matrix.

Functional requirements testing generate the most documentation by the testing board. In addition to the more than 1,200 pages of notes generated, the board will associate digital photographs, video documentation and sections from vendor documents to each test requirement.

The entire process will be video recorded by both surveillance level systems and hand-held camcorder recordings of individual tests.

At the conclusion of this phase, all documentation undergoes an independent audit.

Phase III documentation is included in Binders 7-30 for each system.

Refer to Section 5 of this document for additional information on the functional testing.

2.5 Phase IV – Certification Documents

Phase IV is a two (2) day process where the voting systems testing board meets with the Secretary of State and presents its recommendation, as well as the recommendations of the independent audit, and potential options for the certification of a voting system.

Based on this meeting, the Secretary of State makes a decision on the certification of each vendor and a cover letter and certificate is generated to the vendor stating their certification status.

Typical options for the recommendation include: Full compliance certification, certification with restrictions on use, a temporary

certification (requesting the vendor to address certain items), or refusal to certify the system.

2.6 Phase V – Qualification Report

Phase V is a thirty (30) day process that comes after the decision to certify and is dictated by statute and Rule 45. The qualification report is the summary of all the testing information, notes, documents and findings of the testing board that led to the qualification of a specific system.

This document serves the public's interest by detailing the process that the State used to make a determination on certification. The report also assists the voting system vendor, as it outlines any shortcomings of the system and items that will be focused on moving forward in the future; and finally the report assists the counties who use the system as the report will identify warnings and explanations for any conditions for use assigned to the system.

Pursuant to Rule 45 the qualification report is a public record that will be available for inspection and posted on the Secretary of State's website.

3 Notes Formatting

3.1 Purpose

The purpose of the Notes Formatting section is to provide an explanation and insight into the method for noting certain conditions as the testing board sees fit.

This section will also primarily provide guidelines for the testing board in ensuring some degree of consistency and understanding in the notes made during the functional testing.

3.2 Overview

Providing evidence and documentation are crucial to the voting systems certification process. As the functional testing process is not open to the public, it is important to provide the details of how the testing board came to its conclusions.

The goal of the notes and documentation is to provide the necessary detail to allow an independent analysis of the documentation and results and allow for the reproduction of the tests conducted by testing board.

3.3 Notes on Formats

The following section provides details on specific areas of notes that the testing board felt require additional explanation, as special situations may exist.

This section does not cover each and every item in the test documentation. Additional details can be found in Section 4 of this document for items not covered by this section.

3.3.1 Test Numbers

The test numbers run in series against the requirements. In essence, the following diagram explains the breakdown of the test number:

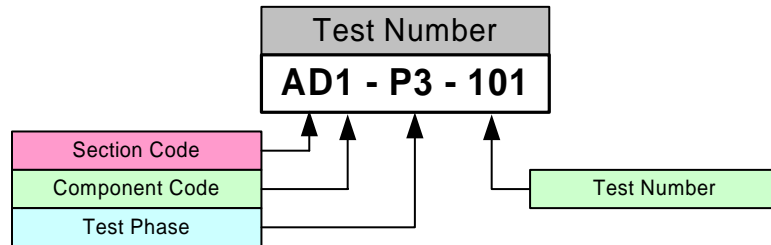


Fig. 3.3.1a – Test Number configuration

The section code is a two digit assignment referring to the type of test being conducted. A full list of the section codes can be found in Appendix 8.1 of this document. Please note that there are four main categories for the requirements, these are:

- “A” – Pre-Test Requirements
- “B” – Security Tests
- “C” – System Testing
- “D” – Election Day Testing
- “E” – Post-Election Day Tests

Subcategories to each of the main categories are broken out in detail in the appendix section of this document.

The component code has been created to further break down the tests, as they would apply to each component of the voting system. This will help the testing board target tests as they apply to the specific components, bringing a higher level of clarity to the documentation.

The component codes are as follows:

- “1” – Direct Record Electronic Voting Devices (DRE)
- “2” – Precinct Count Optical Scanners (PCOS)
- “3” – Central Count Optical Scanners (CCOS)
- “4” – Software components (SOFT)
- “5” – Accessory components (ACC.)
- “6” – Other

Tabs have been inserted into each binder, where applicable. The tabs are labeled with a two-digit code: 01, 02, 03, etc. and the abbreviations listed in the parenthesis of this document.

The test phase is an indication of which phase of the certification process the test applies to. Typically this will be either P2 or P3 (Phase II or Phase III respectively).

Finally, there is the test number. The final three digits represent the test number within the series. The first digit of the test number should match with the component code. So anyone evaluating the sheets could determine that a “101” test is a test for a DRE; a “202” test is a test for a Precinct Count Optical Scanner, and so on.

The exception to this is the document review test numbers. The document review test numbers are all found in binders 2-6 which is code “AB” (refer to appendix 8.1). The test numbers will look similar to figure 3.3.1b:

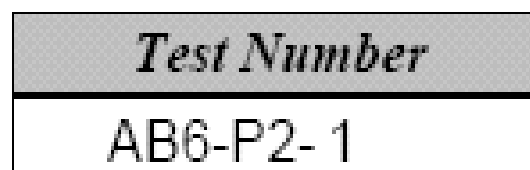


Fig. 3.3.1b – Document Review Test Numbers

As indicated, the Code and Phase are consistent with the previous identification. The difference however is that the test numbers are merely sequential beginning at #1. Please refer to section 4 of this document for the specific details on the document review and the necessity to sequentially indicate these numbers.

3.3.2 Test Status

The test status is the ultimate outcome of the evaluation. For the document review phase, this is referenced as the Test Outcome (see Figure 4.4).

Typical test statuses indicated are as follows:

P = Pass. A passing status is achieved if the component or components being evaluated successfully meet or exceed all areas of the requirement.

PC = Pass Conditional. A pass conditional status is achieved if the component or components being evaluated meet some of the requirement, but not the complete requirement. Alternatively, this status could be achieved if the component doesn't meet the requirement, but an acceptable compensating control can be achieved. Note that in either case, this requirement will need explanation in the compensating control category.

F = Fail. A failure status is achieved if the component does not meet the requirements identified by the text next to the test number on page one.

S = Suspend. A test will be suspended under one of the following conditions: 1) the components needed for the test are unavailable to the test board (missing documentation, missing ballots, database not set up correctly, etc.); 2) the components experienced a hardware failure requiring the test board to stop testing the component; or 3) The test board determined that a prerequisite test was not completed.

N/A = Not Applicable. A test becomes not applicable under any of the following conditions: 1) the test is not required at the time of testing; 2) The component or components do not perform the function in the requirement and cannot be evaluated to it; or 3) The test does not apply to the type of component being evaluated (for example, audio ballots for an optical scanner).

Other codes used will be explained within the text of the document.

3.3.3 Acceptable Compensating Controls

The acceptable compensating controls section is provided on the test documents for the reviewer to indicate any

suggestions by the testing board for a possible solution to an item that does not meet the requirement as tested.

An example of this would be if a modem device does not meet the encryption requirements by the state, a compensating control would be to put a condition on the certification preventing counties from using this feature of the voting system.

3.3.4 Test Incidents

A test incident form would be generated for a specific test number in the case that an unusual or unexpected event takes place requiring either the suspension or the failure of a specific test.

This event could be as simple as a hardware failure (i.e. a power supply failure) on a device, or a catastrophic failure (i.e. DRE error brings up a DOS prompt).

Reviewers will identify in the Attachments section an indication of the presence or absence of a test incident report.

All test incident reports will be filed under the “00” tab for each category.

3.3.5 Test Logs

In addition to the regular documentation, a two page form has been included which includes a table called the test log. Refer to Figure 3.3.5 for an image of the test log.

Environment	2007-CDOS-SEQ-001-0403			Test Number
Pre Election - Voting				CD1-P3 - 107
Test Log				
<i>The test log shall contain procedural steps used to conduct and evaluate the tests. At a minimum, these procedural steps shall include any items related to the setup, start, process, measurements, shut down, retarding, stop and restoring the system as necessary.</i>				
Date	Time	Operator	Activities and Entries	Incident Reports

Fig. 3.3.5 –Test Log Sample

As indicated in the header of the test log, the test log should represent a chronological record of the relevant details about the execution of the tests. The test log shall include notes on at least the following items:

- 3.3.5.1 Setup – describes the sequence of actions necessary to prepare the system for execution of the procedure.
- 3.3.5.2 Start – Describes any actions necessary to begin the execution of the procedure.
- 3.3.5.3 Process – Describes any and all actions necessary during execution of the procedure.
- 3.3.5.4 Measurements – Describes any and all actions necessary to make measurements.
- 3.3.5.5 Shut Down – Describes any and all actions necessary to suspend testing, when unscheduled events dictate.
- 3.3.5.6 Restart – Identifies any procedural restart points and describes the actions necessary to restart the procedure at each of these points.
- 3.3.5.7 Stop – describes the actions necessary to bring execution to an orderly halt.
- 3.3.5.8 Restore – describes any actions necessary to bring the environment to a restore state.

3.3.6 Individual Reviewers

Throughout all of the above mentioned procedures and items mentioned in Section 4 and 5 of this document, each requirement will be evaluated by three individuals.

The overall goal of the evaluation process is to provide sufficient and accurate documentation to support the findings of the voting systems testing board and to allow for outside, independent evaluation to reach the same conclusions as that of the secretary of state.

First, the reviewer will provide a thorough review and documentation of events and statuses. Additional photographs, photocopies and digital video will be attached as supporting documentation. Upon satisfaction, the reviewer will indicate a result in the *results summary box* in preparation for the second reviewer.

The next reviewer will evaluate the documentation made in the first review and make a determination if the

documentation supports the observations, findings, and results summary. A note will be made in the *results summary box* of this indication. The second review may request the first reviewer to reevaluate or attach additional documentation to support their findings. Additionally, the second reviewer may either observe the findings during the testing by the first review, or independently conduct the tests separate from the first reviewer as necessary.

Finally, when both first reviewers agree on their solution, the supervisor (or Program Director) will evaluate the documentation, findings, test log, procedures, variances, and observations and make a determination on the final test status that all three conditions are met:

- 1) the documentation is sufficient and accurate to support the findings;
- 2) the specific observations and findings are detailed and in support of the results summary, acceptable compensating controls, and final test status; and
- 3) the final test status will either agree with federal testing results and vendor documentation, or the status is such that discrepancy documentation will be filed with the vendor documenting such issues.

4 Document Review

4.1 Purpose

The purpose of this section is to provide more detailed information as to the method of approach for the document review phase of voting systems certification.

4.2 Overview

As mentioned in section 2.3 of this document, document review is conducted in Phase II of the certification process.

Vendors provide a variety of documents for the voting systems testing board to review as required on the application for certification posted at www.elections.colorado.gov under “Voting Systems”, “Colorado’s Voting Systems Certification Program”, “Application for Certification – Updated mm/dd/yyyy.”

The documents are evaluated to the requirements contained in the federal testing to ensure that all tests have been properly conducted with a successful outcome at the federal level. In addition, there are several state requirements that are evaluated during this phase.

4.3 Status

The document review section was produced as a single requirement that spans multiple components of a system. Each system may have a test status for any one of up to seven or eight items depending on each system. The status codes will appear in the Test Status box as indicated in figure 4.3:

<i>Test Outcome (P,F,PC,S,R,D,N\A)</i>	
P;	P; S; S; S; S; S;

Fig. 4.3 Test Status and Outcome example.

In this case, the evaluator is identifying that for this requirement the first and second components have passed, the remainder of items have been suspended until proper documentation is provided on the item. The order and list of each component is provided typically in the “Notes” section of the form. An additional cover page may be present to provide additional details. The cover page would be located in Binder #2.

4.4 Individual reviews

The document review phase is conducted by a three level review process as indicated in Section 3.3.6.

Reviewers often code notes and comments into a database rather than handwriting the notes on the forms during this phase of review. The documents are reprinted as necessary when additional comments and/or reviews are added. A final report is printed when all document review and re-evaluations are completed. This is indicated with the words: “Final version” in the footer section of the document.

5 Functional Testing

5.1 Purpose

The purpose of this section is to provide detailed information as to the approach of the voting systems test board to the functional testing of voting systems pursuant to Secretary of State Rule 45.

5.2 Overview

As indicated in Section 2.4, functional testing is phase III of the certification process. Vendors coordinate with the Secretary of State the date and time of the equipment testing in conjunction with the requirements of Secretary of State Rule 45.3.

Based upon documentation confirming completion of federal level tests, the testing board makes a determination of the specific components that shall be tested.

The State of Colorado considers voting systems certifications as a package of systems to be certified together, as the components must work together towards a common goal.

This package must include at least the following components:

- Elections Management Software (SOFT) – the software component of the voting system which creates the layout of the ballots for printing or using on DRE systems, as well as the geographical data which includes the districts, precincts, offices and candidates for the election.
- Precinct Count Optical Scanner (PCOS) – a portable scan unit that can process ballots from a limited number of precincts, or in some cases from all of the precincts for a jurisdiction. The precinct count scanner must process at least 1,000 ballots during testing.
- Central Count Optical Scanner (CCOS) – a stationary optical scan unit that can process ballots from all precincts within the jurisdiction. This scanner will typically process absentee and potentially early voting ballots.
- HAVA compliant accessible voting device (DRE) – based on current state law, the voting system must contain a DRE based solution for HAVA compliance. The DRE is usually a tablet based system on a stand with a Voter-Verifiable Paper Audit Trail (V-VPAT), as well as activation units, voter access cards and potentially other hardware to make the unit accessible.

The test board will consider other items such as ballot marking devices, card programmers, and older models of systems in manners consistent with both state law and federal testing processes.

5.3 Functional Test Pages

The functional testing documents consist of a baseline of 5 pages. Each page will be described in detail below. In most cases, the expectation is high that additional pages will be inserted as references to digital photographs, vendor documentation or other files are referenced.

5.3.1 Page 1

Page 1 is the cover page for the testing and indicates the system and test number.

5.3.1 Page 2

Page 2 contains background information, requirements information, device types to be tested specific to that system and information on the procedure, prerequisites, and variances to use for the test.

5.3.2 Page 3

Page 3 contains the test log which is described in depth in section 3.3.5 of this document.

5.3.3 Page 4

Page 4 is a continuation of the test log, followed by the attachments, compensating controls, and final test status. Page 4 also contains signature blocks for the three reviewers.

5.3.4 Page 5

Page 5 contains the official Observations and findings of the testing. Page 5 also contains signature blocks for the three reviewers.

5.4 Items on Test Pages

This section will walk through in detail the requirements for each of the items on the test pages. Additional detail can be found in section 3 of this document.

5.4.1 Background Information

The background information sets the stage for the tester. Information such as the requirement (Rule or Statute), the text of the requirement, the test number, test type, equipment being tested is included in the background information section.

5.4.2 Procedures and Prerequisites

The procedures and prerequisites section contains the following four items:

Purpose – explains the purpose of the specific test.

Procedure – details the procedures used to conduct the test.

Prerequisites – details any required prerequisite test necessary to conduct the current test.

Variances Used – explains any non-normal situations that the testers used to create atypical response from the

system. Each variance will have findings and/or observations by the test team as appropriate.

5.4.3 Expected Outcome

The expected outcome is the anticipated result of the tests to achieve a passing status.

5.4.4 Test Log

The test log is detailed in section 3.3.5 of this document.

5.4.5 Attachments

The attachments section is the area where the test board will identify any and all attachments used during the test. Typically the attachments will fall into the category of paper, video or photo type documents.

5.4.6 Acceptable Compensating Controls

The acceptable compensating controls section is identified in section 3.3.3 of this document.

5.4.7 Results Summary

The results summary is detailed in section 3.3.6 of this document.

5.4.8 Final Test Status

The final test status is detailed in section 3.3.2 of this document.

5.4.9 Observations

The observations section will contain notes on observations made by the testing board during the testing process.

5.4.10 Findings

The findings section will contain the official findings of the testing board from each of the tests conducted.

5.4.11 Signatures

The use of the signature block is detailed in section 3.3.6 of this document.

5.5 Process

In general, the process used for the functional testing will be consistent for each system. The testing board may adapt the normal flow based on need, staffing, equipment submitted, etc.

5.5.1 Demonstration

The demonstration is also known as the public demonstration as this time period is open to the public to the extent possible given the space available at the Secretary of State's office.

The vendor must demonstrate all components of the system to the voting systems team. The demonstration is evaluated using the same criteria as the functional testing.

The details of the requirements for demonstration are found in Secretary of State Rule 45.6.1.

5.5.2 Trusted Build

The vendor must deliver or make arrangements for delivery of the trusted build of the software used for testing pursuant to Secretary of State Rule 45.4.6. Please refer to Figure 5.5.2 for the model used for the handling of the trusted build.

Upon receipt of the trusted build, The Secretary of State will secure the media containing the information and ensure the chain of evidence is included. The process for securing will be to place the media in a "trusted build" suitcase, placing at least two seals on the suitcase, and arming the suitcase with an audible alarm. The chain of custody document will be updated and placed with the suitcase into the secure safe.

The safe is secured in a limited access room with 24x7 surveillance monitoring. The safe uses a key and combination lock. Only one staff member will have access to the key, and another will have the combination. The combination is changed once every 24 months.

Voting System Trusted and Witnessed Build Chain of Custody Model

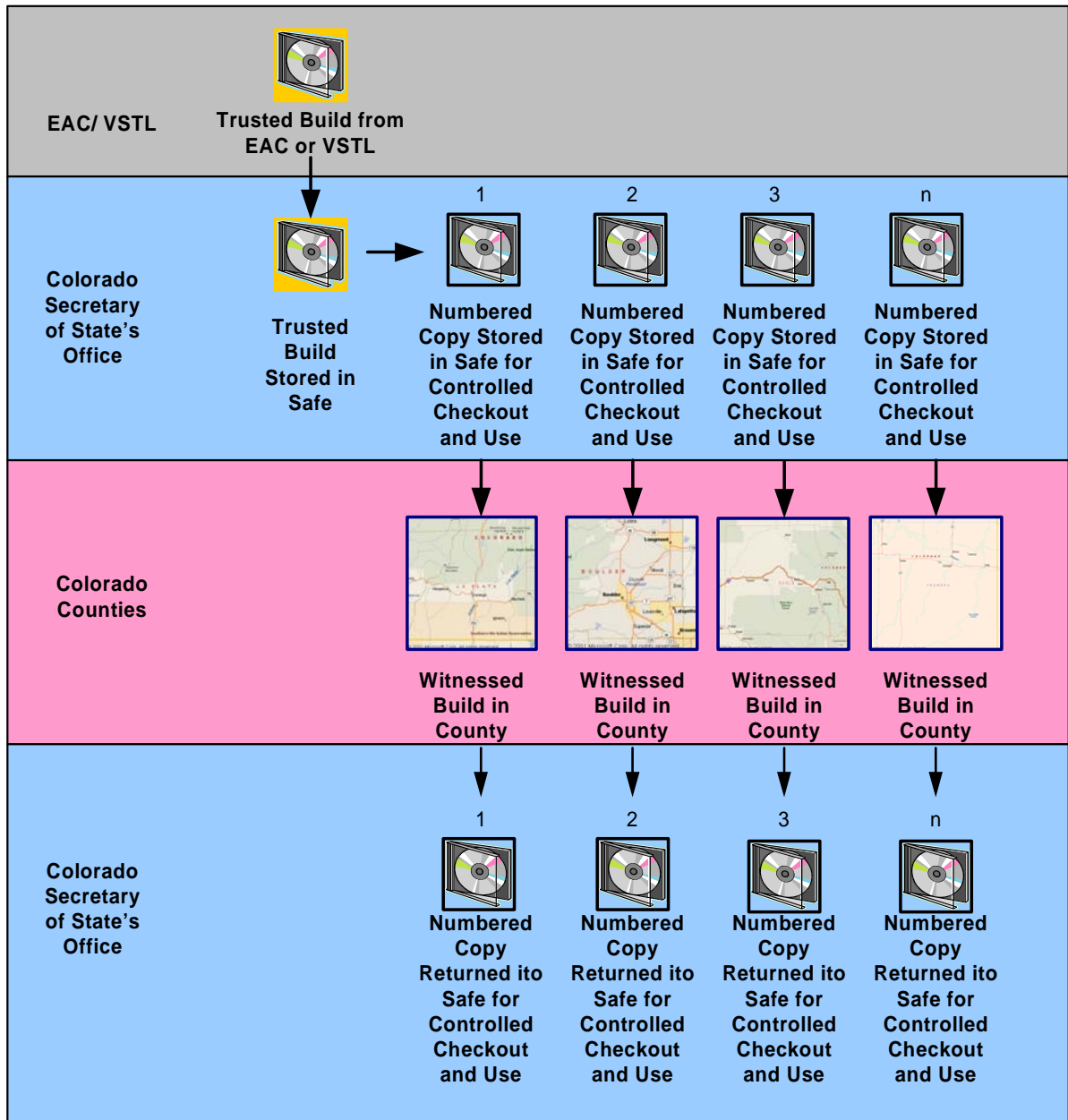


Fig. 5.5.2 Trusted build model.

Upon commencement of the demonstration period (Phase III) of the voting system, the State will work in conjunction with the vendor to install the trusted build version(s) of the software and firmware onto the devices for testing.

At this point, the Secretary of State will identify procedures for both installing and verifying the trusted build for the system being tested. These procedures will later be used by the State to install or verify the trusted build for all machines of the tested system (assuming successful completion of certification) in the state.

In lieu of the final storage location being in the Secretary of State's office, the vendor may work with the Secretary of State to secure escrow through a third party vendor.

5.5.3 Test Script Process

The test script process will be followed as identified in Figure 5.5.3.

Part 1 is completed prior to the functional testing process and involves identifying and numbering the test items to be conducted.

Part 2 is the development of the test procedures. This involves documenting the test procedures, and prerequisites for any given test. Test board members will create these procedures from the documentation submitted by the vendor. Typically a reference will be included to use a vendor's included material (for example, the poll worker guide, administrator guide, users manual, etc.) for the procedural steps. This is framed into the procedures statement. Additionally, test board members will document any variances used in conducting the test which may allow for observing alternate, unexpected responses from the system.

Part 3 is the execution of the test. It is during this time that the test monitor will make record of all documentation which would include paper, video, and digital photograph documentation. The test logs will be completed as appropriate as well as the official findings and observations of the system. At this point, the monitor will provide date and signature upon the completion of the review and execution of the test.

Part 4 is the final review/evaluation. Part 4 involves the second and third review of the test procedures, notes, documentation and outcome. All documentation attached from the first review will be verified for accuracy and proper

notation, any possible and/or necessary compensating controls will be identified, the final test status will be identified and signatures with end dates will be updated and addressed as necessary.

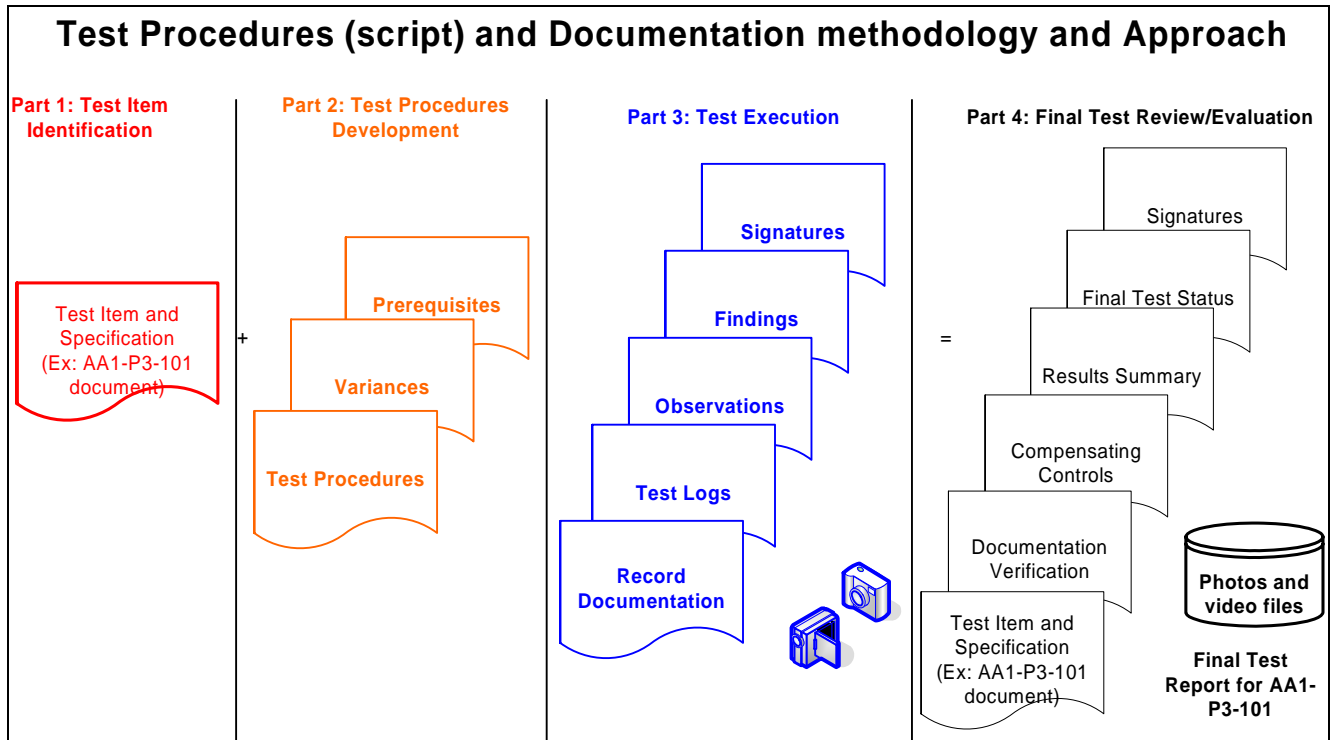


Fig. 3.3.5 –Test Procedures Methodology.

5.5.4 Databases for the testing

The vendor must deliver with the system three base election setups – a Primary Election, a coordinated election, and a recall election scenario. The state will conduct tests using ballots and other definitions based on this.

Additional details on the database requirements can be found in the instructions for vendors posted at www.elections.colorado.gov under "Voting Systems", "Colorado's Voting Systems Certification Program", and "Instructions for Vendors Applying for Certification."

5.5.5 Test Decks

The vendor is responsible for providing ballots to the test board for testing voting equipment. The ballots requested are for each election type, including ballots that are folded, flat, and provisions for alternative languages.

The test board is responsible for marking the ballots as appropriate for the tests that are being conducted. Ballots will be used multiple times to determine successful outcomes of voting equipment accuracy.

Additional details on the test decks can be found in the instructions for vendors posted on our website at: www.elections.colorado.gov under "Voting Systems", "Colorado's Voting Systems Certification Program", and "Instructions for Vendors Applying for Certification."

6 Appendix

8.1 Requirements Organization for Colorado Certification

Requirements Organization for Colorado Certification							
	Binder #	Category	Section Code	# of Tests	# of pages	# of Binders	
Pre Testing	1	Application	aa	22	47	1	
	2-6	Documentation Review	ab	898	900	5	
	7	Demonstration	ac	54	116	1	
	8	Trusted Build	ad	20	43	1	
	9-12	Source Code Review	ae	336	722	4	
Security Testing	13	System Access	ba	60	129	1	
	14	Operating System Security	bb	20	43	1	
	15	Database Security	bc	24	52	1	
	16	Removable Media	bd	13	28	1	
	17	Networking and Telecommunications	be	46	99	1	
System Testing	18	System	ca	79	170	0.9	
	18	System (central count)	cb	16	34	0.1	
	19-20	Ballot Process	cc	161	346	2	
	21	Performance	cd	25	54	0.5	
	21	DRE Processing	ce	24	52	0.5	
	22	Audits	cf	29	62	0.5	
	22	Reports	cg	52	112	0.5	
Election Day Testing	23	Hardware Diagnostics Testing	da	8	17	0.2	
	23	Voting	db	65	140	0.8	
	24	Multi-Page Ballots	dc	6	13	0.3	
	24	Multiple Languages	dd	4	9	0.3	
	24	Provisional	de	25	54	0.4	
	25	V-VPAT	df	28	60	0.5	
	25	Accessibility	dg	41	88	0.5	
	26	Closing Polls	dh	30	65	1	
Post Election Day Tests	27	Post Election Audit	ea	4	9	0.4	
	27	Recount	eb	8	17	0.3	
	27	Recount (central count)	ec	6	13	0.3	
Documentation	28	Video Documentation Log				1	
	29	Safe Documentation Log				1	
	30	Other Notes/Logs				1	